TENNESSEE

Gateway Assessment

Item Sampler

Science

Contents

Introduction to Gateway Science

Content of Tests

The testing program titled the *Tennessee Gateway Assessment* was established to meet the Tennessee mandate for high stakes, end-of-course assessments in Tennessee secondary schools. These tests measure the Tennessee Performance Indicators. Subject areas covered by the testing program include Mathematics, Language Arts, and Science.

Test Development

For the *Tennessee Gateway Assessment*, a staff of writers—composed of both teachers and professional test developers experienced in each of the content areas—researched and wrote the items. Professional editors and content specialists carefully reviewed all items and test directions for content and accuracy. To provide a large pool of items for final test selection, the test developers created approximately twice as many items as were needed in the final editions of the tests.

After tryout tests were administered, student responses were analyzed. Professional content editors and researchers carefully reviewed items, their data, and test directions for content, suitability, and accuracy before including particular items and test directions in operational tests.

Test Administration

Tennessee Gateway Assessments are given to students as they near the end of courses that are included in the program. Tests may be given midyear for block schedules or near the end of the school year.

Each test contains 62 multiple-choice questions.

Students will have ample time to read and answer each of the questions. Each test has been designed to be administered in one session.

Tips for Students Taking the Test

Preparing for the test

- Review this Tennessee Gateway Item Sampler for Science carefully and thoroughly.

- Acquire a Tennessee Gateway Practice Test for Science, and take the test several times.

- Become familiar with the correct way to mark answers on the answer sheet. There is a sample answer sheet in the Practice Test.

Before the test

- Get a good night's sleep. To do your best, you need to be rested.

During the test

- Relax. It is normal to be somewhat nervous before the test. Try to relax and not worry.

- Listen. Listen to and read the test directions carefully. Ask for an explanation of the directions if you do not understand them.

- Plan your time. Do not spend too much time on any one question. If a question seems to take too long, skip it and return to it later. Answer all questions you are sure of first.

- Think. If you are not sure how to answer a question, read it again and try your best to answer the question. Rule out answer choices that you know are incorrect and choose from those that remain.

Directions for Using the Item Sampler

This Item Sampler for Science provides specific information to students and teachers. It contains examples of different item types for each Performance Indicator that may be tested in any given Gateway test administration. Performance Indicators have been grouped under Reporting Categories. These Reporting Categories will be used to report information regarding performance on the Gateway tests to students, teachers, schools, and systems.

The items in this Item Sampler will not be found in the Gateway tests. The number of items in this Item Sampler does not reflect the emphasis of content on the test. In order to identify the emphasis of content, the Gateway Assessment Practice Test for Science should be used. The Practice Test gives a better representation of content emphasis across Reporting Categories and Performance Indicators.

An Answer Key is located on page 46. Use it to check your answers. Review items that you get wrong.

Reporting Category: 1. Cell Organelles and Biomolecules

Performance Indicator: Identify major cell organelles and their functions, given a diagram, description, and/or scenario.

1 **A plant cell is shown below.**

endoplasmic
reticulum

nucleus

Golgi
apparatus
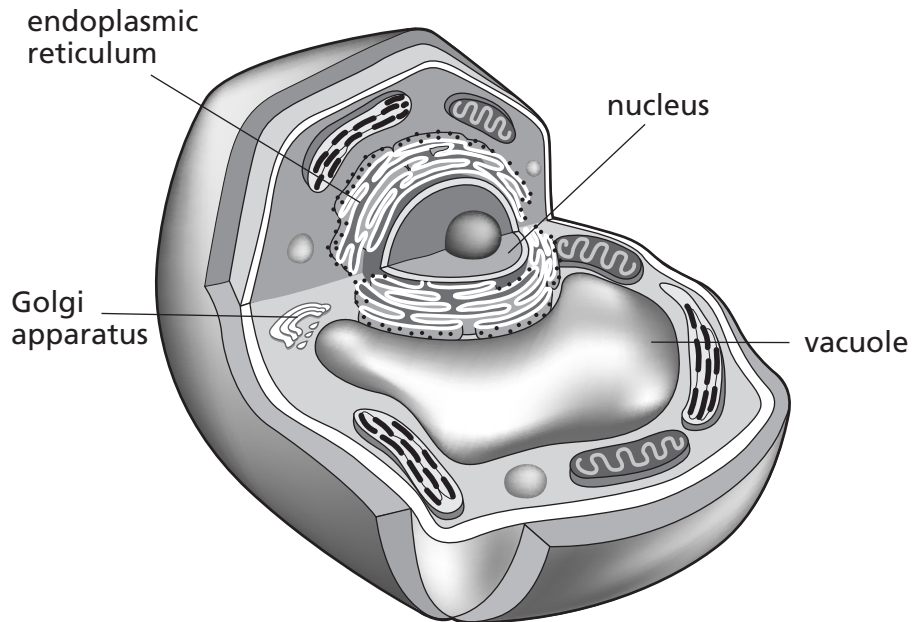
vacuole

In which organelle are chromosomes replicated?

A   the nucleus

B   the vacuole

C   the Golgi apparatus

D   the endoplasmic reticulum

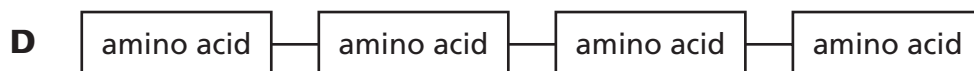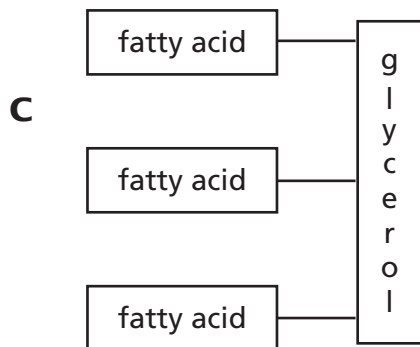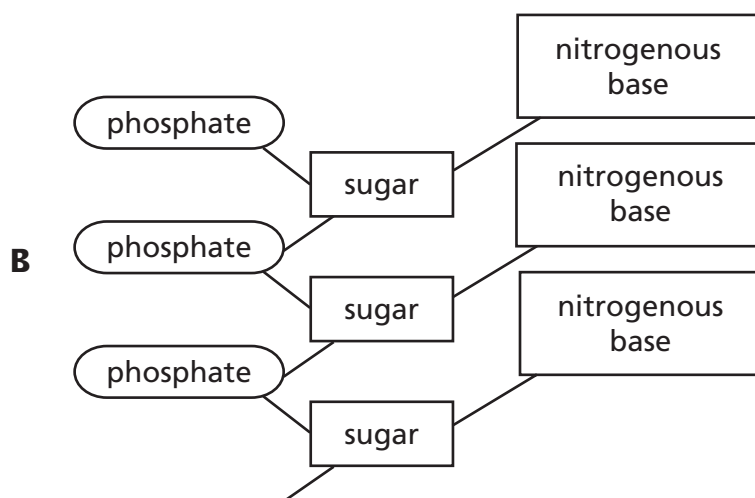**Performance Indicator:** Distinguish between plant and animal cells given diagrams or scenarios.

2 A student wants to know if a cell is from a plant or an animal. Which of these will be present in a plant cell but not in an animal cell?

    F chloroplasts

    G mitochondria

    H a cell membrane

    J an endoplasmic reticulum

Performance Indicator: Distinguish among proteins, carbohydrates, lipids, and nucleic acids, given structural formulas.

3 **Which of these molecules is a lipid?**

A | sugar | — | sugar | — | sugar | — | sugar | — | sugar |

B

phosphate

sugar — nitrogenous base

nitrogenous base

phosphate

sugar — nitrogenous base

phosphate

sugar — nitrogenous base

C

| fatty acid | — glycerol

| fatty acid | — glycerol

| fatty acid | — glycerol

D | amino acid | — | amino acid | — | amino acid | — | amino acid |

Performance Indicator: Identify a positive test for carbohydrates and lipids when given an experimental procedure, data, and results.

4 A scientist performed three tests to identify several unknown substances. The results of these tests are summarized in the chart below.

Unknown Substance	Dissolves in Water?	Leaves Spot on Brown Paper, Letting Light Shine Through?	Turns a Dark Color in Iodine Solution?
Substance 1	Yes	No	Yes
Substance 2	No	Yes	No
Substance 3	No	No	No
Substance 4	Yes	No	No

According to the chart, what type of molecule is Substance 2?

F a lipid

G an amino acid

H a nucleic acid

J a carbohydrate

Performance Indicator: Identify the biomolecules responsible for communication, response, regulation, or reproduction in the cell.

5 What type of molecule carries information from DNA to the site where it is used as directions for building proteins?

A ribosomes

B amino acids

C transfer RNA

D messenger RNA

Reporting Category: 2. Cell Processes

Performance Indicator: Predict the movement of water molecules across a semi-permeable membrane, given a diagram showing solutions of different concentrations.

**6** **A cell placed in a solution is diagrammed below.**
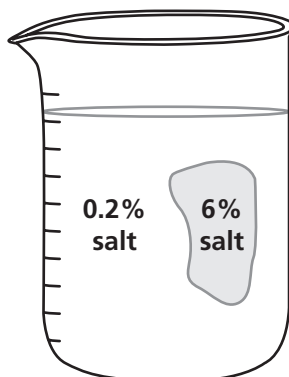
Which of these statements describes conditions in which a cell will swell with water?

F   The same amount of dissolved substances is present inside and outside of a cell.

G   A small amount of dissolved substances is continuously moving in and out of a cell.

H   A lower concentration of dissolved substances is present inside a cell, and a higher concentration of dissolved substances is present outside the cell.

J   A higher concentration of dissolved substances is present inside a cell, and a lower concentration of dissolved substances is present outside the cell.

Performance Indicator: Sequence a series of diagrams depicting the movement of chromosomes during the cell cycle.

7 **The diagram below shows the stages of mitosis, but they are out of order.**
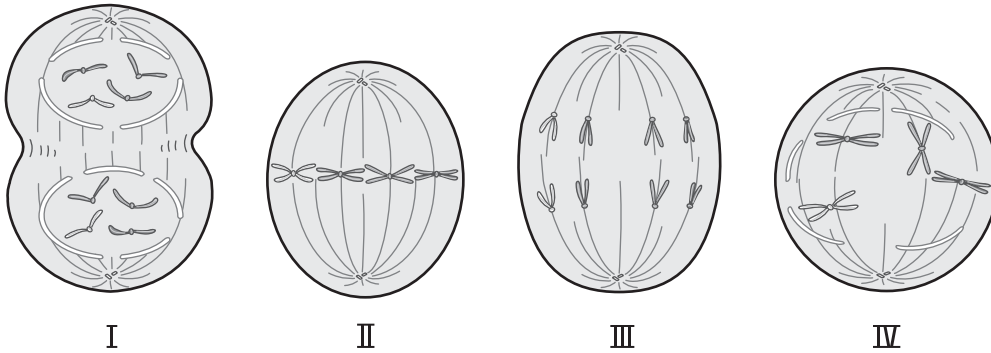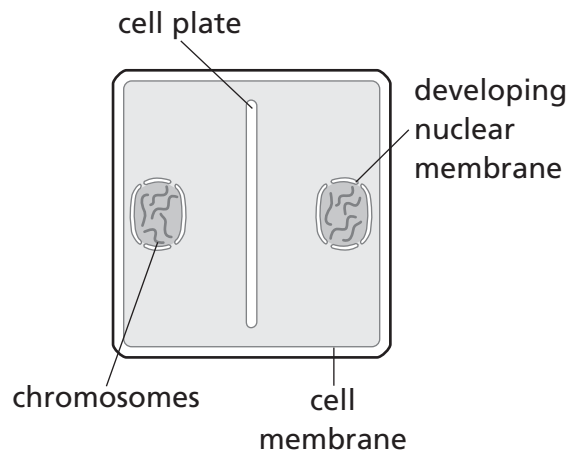

I   II   III   IV

What is the correct order for the stages of mitosis?

A   I – II – IV – III

B   III – I – II – IV

C   IV – II – III – I

D   IV – III – II – I

Performance Indicator: Compare and contrast the cell cycle in plant and animal cells, given a diagram or description.

8 **The diagram below shows a dividing plant cell.**

cell plate

developing
nuclear
membrane

chromosomes

cell
membrane

Which of these structures would <u>not</u> be present in a dividing animal cell?

F a cell plate

G chromosomes

H a cell membrane

J a developing nuclear membrane

Performance Indicator: Distinguish between active and passive transport, given examples.

9 **Which of these processes requires cellular energy to move molecules across cell membranes?**

A active transport

B passive transport

C diffusion

D osmosis

Performance Indicator: Evaluate the role of meiosis in maintaining genetic variability and continuity, given a scenario.

10 **The diagram below shows two chromosomes crossing over during meiosis.**

Which of these will most likely result from crossing over?

F   Four identical cells would be produced.

G   New genetic combinations of traits would be produced.

H   The chromosomes will not be able to function normally.

J   The chromosomes will not be able to separate properly.

Performance Indicator: Determine the number of chromosomes following mitosis or meiosis, given the number of chromosomes in the original cell.

11 **A cell with 20 chromosomes undergoes *mitosis*. How many chromosomes will most likely be present in each resulting daughter cell?**

A   5

B   10

C   20

D   40

Performance Indicator: Recognize the importance and mechanisms of homeostasis to the viability of organisms, given a scenario.

12 **Organisms are able to keep their internal conditions in a state of balance called *homeostasis*.**

In which of these situations would humans probably have to worry most about water balance in their cells?

F   while swimming in a lake

G   while hiking at high altitudes

H   while sleeping for long periods

J   while walking through a desert

Reporting Category: 3. Interactions: Between Organisms and Behavior

Performance Indicator: Identify commensalism, parasitism, and mutualism, given a scenario with examples.

13 **Pitcher plants are carnivorous plants with digestive juices inside a modified leaf. When insects land to feed on the nectar, they are trapped and digested. However, a certain kind of spider lives in pitcher plants, catching insects that are drawn to the smell of the plant. The spiders produce wastes that are more nutritious to the plant than are insects.**

Which type of ecological relationship exists between the spiders and the plants?

A mutualism

B parasite-host

**C** predator-prey

D commensalism

Performance Indicator: Classify an organism as a producer, consumer, or decomposer, given its behavior.

14 **Some species of bacteria live in communities on the ocean floor near vents that release heated water and sulfur. Some of these bacteria use the sulfur to make their own food.**

What is the role of these bacteria in their communities?

F producer

G scavenger

H consumer

J decomposer

Performance Indicator: Identify abiotic and biotic factors, given a description or an illustration of an ecosystem.
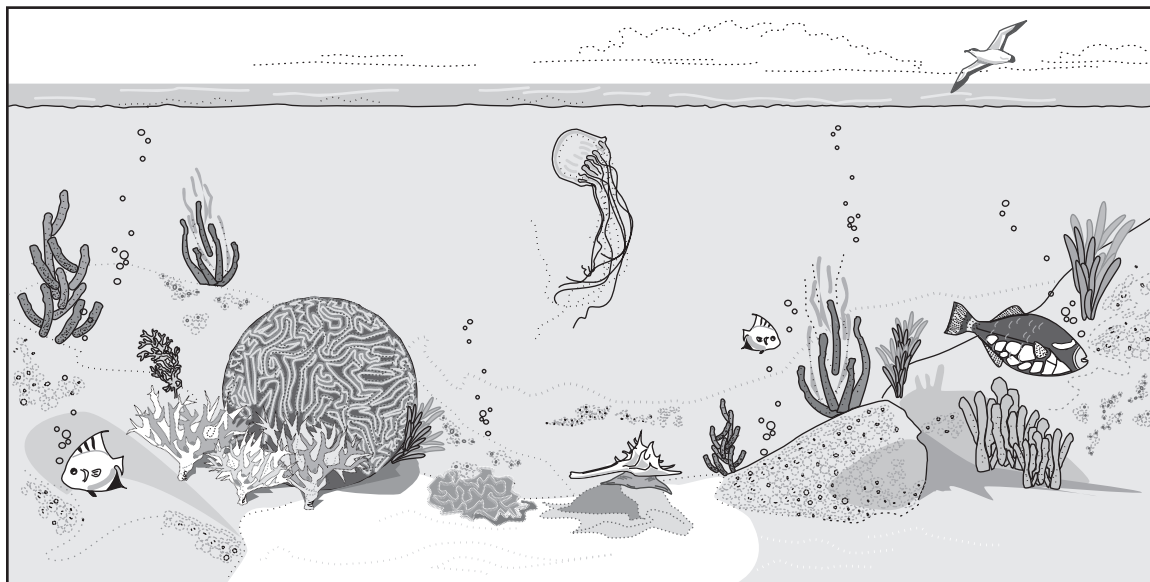
15 **Which of these is a *biotic* factor in the coral reef ecosystem shown above?**

　A　the number of fish
　B　the amount of oxygen in the water
　C　the amount of sunlight
　D　the temperature of the water

Performance Indicator: Distinguish between a learned or an innate behavior, given a description of that behavior.

16 **Newly hatched gull chicks will crouch down when they see any object flying above them, even a falling leaf. The chicks later observe that most things flying above them will not cause them harm. Older gull chicks will crouch down only when they see dangerous birds flying over them.**
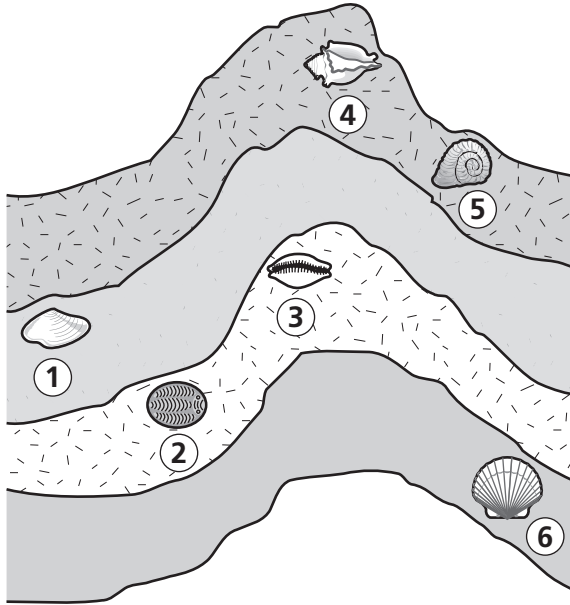
The behavior exhibited by the older gull chicks is an example of

　F　mimicry
　G　imprinting
　H　innate behavior
　J　learned behavior

Performance Indicator: Differentiate between the relative age of fossils in sedimentary rock, given a diagram, scenario, or description of rock strata.

17 **The diagram below shows layers of sedimentary rock containing fossils.**

Which fossil is older than Fossil 4 but younger than Fossil 2?

A   Fossil 1

B   Fossil 3

C   Fossil 5

D   Fossil 6

Reporting Category: 4. Interactions: Population Dynamics and Energy Flow

Performance Indicator: Make inferences about how environmental factors would affect population growth, given a scenario.

18 **A population of gray squirrels was introduced into an area of forest containing a population of red squirrels. Both red and gray squirrels eat the same kinds of foods.**

The introduction of gray squirrels will <u>most likely</u> cause the red squirrel population to

F increase

G decrease

H stay the same size

J increase and then decrease

Performance Indicator: Examine the energy flow through the trophic levels of an ecosystem, given a diagram and/or scenario.

The diagram below shows the trophic levels of an energy pyramid. Use the diagram to answer Number 19.
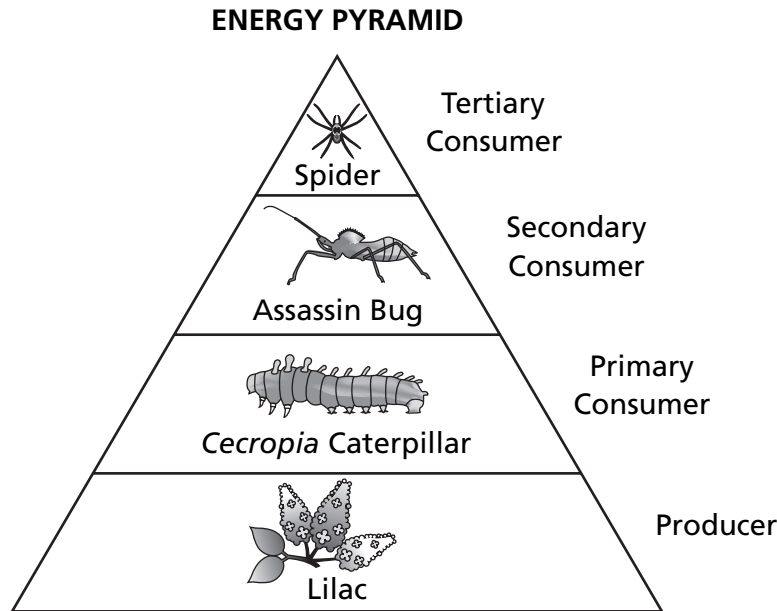
ENERGY PYRAMID

19 **Which of these statements is true about the amount of energy available to the organisms in the pyramid?**

A   The energy available increases as it flows from the lilac to the spider.

B   The energy available decreases as it flows from the lilac to the caterpillar.

C   The energy available remains constant as it flows through the levels of the energy pyramid.

D   The energy available increases and then decreases as it flows through the levels of the energy pyramid.

Performance Indicator: Determine the effects of human activities on ecosystems, given a scenario.

20 **Bob and his neighbor Hai have similar plants in their backyards. Bob uses insecticides in his backyard several times each year but Hai never uses insecticides. Which of these statements explains how the two yards are most likely different?**

    F   Hai's yard has more trees.

    G   Bob's yard has a higher mineral content.

    H   Birds are seen more frequently in Hai's yard than in Bob's yard.

    J   House cats are seen more frequently in Bob's yard than in Hai's yard.

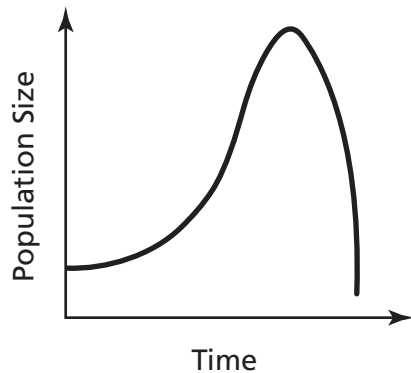**Performance Indicator:** Analyze and interpret population growth curves, given graphs.

21 **Which of the following graphs represents a population that has grown in number and reached its carrying capacity?**
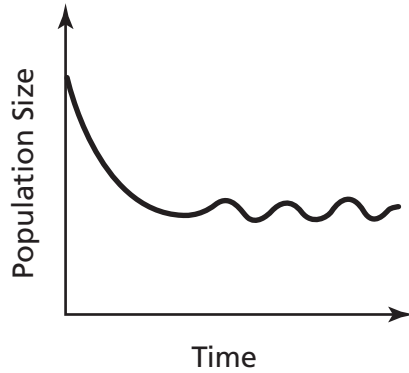

A

C

B

D
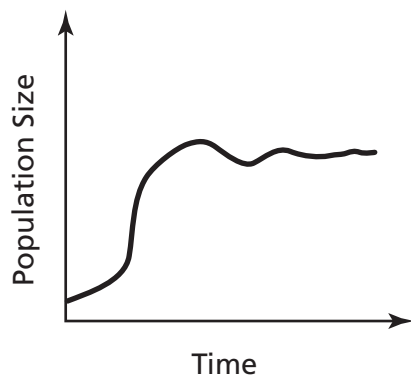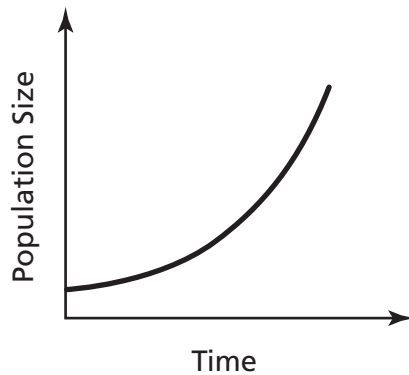
Performance Indicator: Predict how environmental changes affect the formation of a new species or extinction of an existing species, given a scenario.

22 **A meadow has always sustained a large population of land snails. During a major flood, a large lake forms that divides the snails into two separate populations. After millions of years of isolation, the two snail populations will <u>most likely</u>**

F learn to cross the lake

G compete for the best habitat

H become different species

J remain unchanged

Performance Indicator: Differentiate between natural selection and selective breeding, given a scenario.

23 **An area experienced a major change in climate, resulting in much drier conditions. One species of plant in this area had deep roots and stems that could store large amounts of water. Another species of plant in this area had shallow roots and stems that did not store water. The population of plants with shallow roots eventually became extinct, while the population of plants with deep roots increased.**

Which process led to the extinction of one species and the success of the other species?

A parasitism

B commensalism

C natural selection

D selective breeding

Reporting Category: 5. Photosynthesis and Respiration

Performance Indicator: Identify the reactants and products of photosynthesis and respiration, given the equations.

24   **What is the basic equation for respiration?**

F | carbon dioxide | + | glucose | ⟶ | oxygen | + | water |

G | carbon dioxide | + | water | ⟶ | oxygen | + | glucose |

H | oxygen | + | glucose | ⟶ | water | + | carbon dioxide |

J | oxygen | + | water | ⟶ | glucose | + | carbon dioxide |
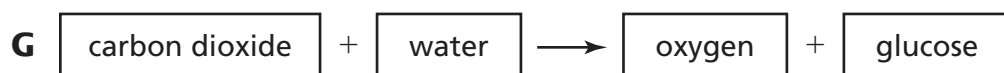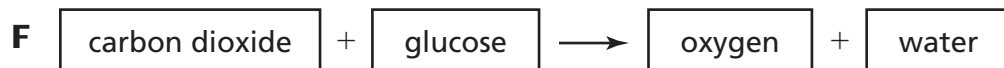
Performance Indicator: Identify the cell organelle in which photosynthesis and/or respiration occurs, given a diagram.

25 **Look at the diagram of the plant cell below.**
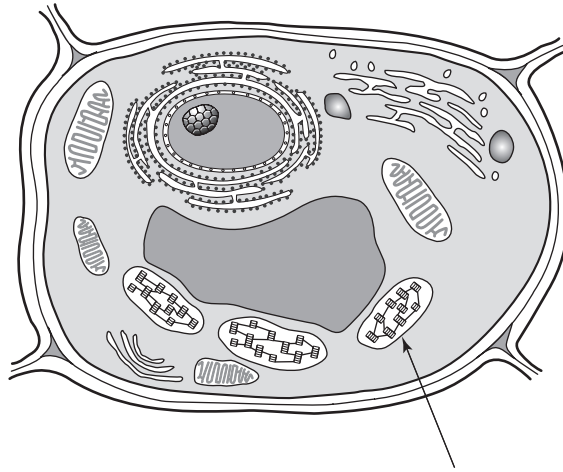
Which of these processes occurs in the organelle that the arrow is pointing to?

A   mitosis

B   respiration

C   transpiration

D   photosynthesis

Performance Indicator: Interpret a diagram of the carbon-oxygen cycle.
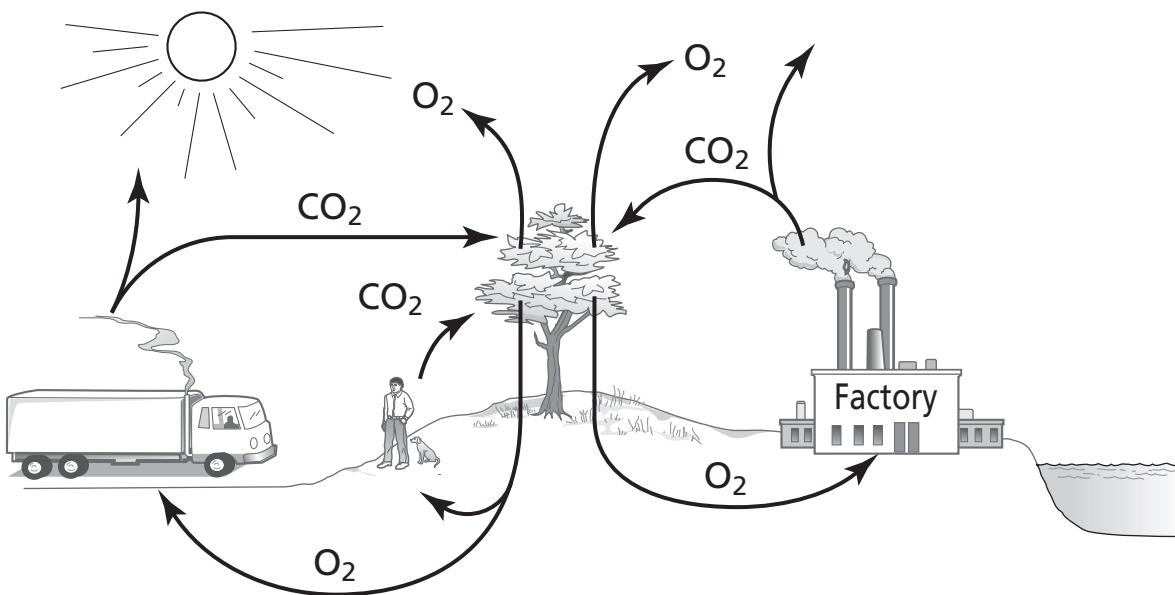
26 The diagram below traces the movement of oxygen and carbon dioxide through the environment.

What is the main source of energy for the processes in the diagram?

F oxygen

G wind

H water

J sunlight

Performance Indicator: Distinguish between aerobic and anaerobic respiration in terms of the presence or absence of oxygen and ATP produced.

27 One difference between aerobic and anaerobic respiration is that aerobic respiration

A produces more ATP than anaerobic respiration

B produces less ATP than anaerobic respiration

C uses carbon dioxide and anaerobic respiration uses oxygen

**D** uses nitrogen and anaerobic respiration uses carbon dioxide

Performance Indicator: Investigate the interdependence of photosynthesis and respiration in living organisms, given a diagram or scenario.

28 **Chloroplasts store energy by producing sugar, and mitochondria use products from the breakdown of sugar to release energy for cell processes and growth. Which of these statements best describes photosynthesis and respiration?**

F Photosynthesis and respiration both occur in plants and animals.

G Photosynthesis and respiration are processes that depend on each other.

H Photosynthesis only occurs in plants, and respiration only occurs in animals.

J Photosynthesis and respiration are processes that cannot occur at the same time.

Performance Indicator: Relate how energy is transferred from cellular energy to cellular work.

29 **The diagram below shows energy cycling in a cell.**
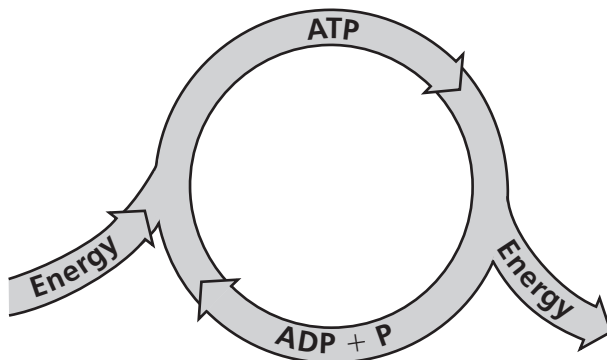
What happens when ATP changes to ADP?

A Phosphate bonds are formed, storing energy for later use.

B Phosphate bonds are broken, storing energy for later use.

C Phosphate bonds are broken, releasing energy to perform work.

D Phosphate bonds are formed, releasing energy to perform work.

Reporting Category: 6. Genetics

Performance Indicator: Distinguish between asexual and sexual methods of reproduction, using a scenario.

30 Different parts of many plants can be used to grow new plants. For example, the roots of many plants can be split off and planted. They will then grow into whole new plants.

This is an example of

F selective breeding

G ecological succession

H sexual reproduction

J asexual reproduction

Performance Indicator: Identify dominant and recessive traits, given the results of a monohybrid cross in a scenario.

31 In humans, the gene for the presence of hair on the middle segments of fingers has two alleles. This gene has only two possible phenotypes.

A father is heterozygous and has hair on his fingers, and a mother is homozygous and does not have hair on her fingers. Each of their children has a 50% chance of having hair on his or her fingers.

According to this information, which of these statements is most likely true?

A Both of the alleles are sex-linked.

B Both of the alleles are incompletely dominant.

C The allele for no hair on the fingers is dominant.

D The allele for hair on the fingers is dominant.

Performance Indicator: Determine the genotype and phenotype of a monohybrid cross, given a Punnett square.

32 **A species of beetle has an allele for black spots (B) that is dominant and an allele for gray spots (b) that is recessive. A cross between two beetles is shown in the Punnett square below.**

	B	B
B	BB	BB
b	Bb	Bb

What phenotypes are expected for the offspring from this cross?

F 0% black-spotted and 100% gray-spotted

G 50% black-spotted and 50% gray-spotted

H 75% black-spotted and 25% gray-spotted

J 100% black-spotted and 0% gray-spotted

Performance Indicator: Identify the sex chromosomes in humans and recognize inheritance patterns that are sex-linked (x-linked), using a pedigree or scenario.

33 **A disease with the inheritance pattern shown in the pedigree below was detected only in males.**
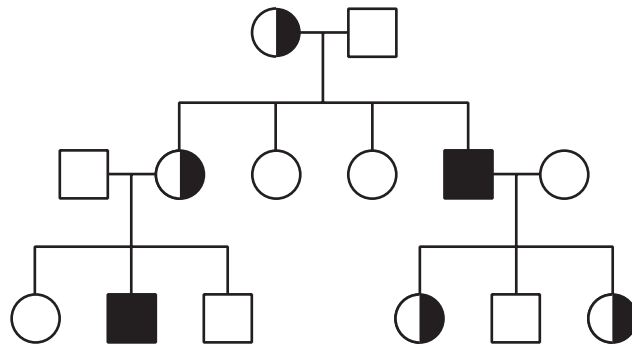
KEY	
◯	Normal female
◑	Carrier female
☐	Normal male
■	Affected male

What pattern of inheritance does the disease have?

A autosomal dominant

B autosomal recessive

C X-linked recessive

D Y-linked recessive

Performance Indicator: Analyze modes of inheritance including codominance, incomplete dominance, and multiple alleles using genetic problems or Punnett squares.

34 **A mammal with red hairs was crossed with a mammal with white hairs. All of the offspring had both red and white hairs.**

This is an example of what type of inheritance?

F polygenic

G sex-linked

H codominance

J incomplete dominance

Performance Indicator: Determine the probability of having a child with an autosomal disorder, such as cystic fibrosis or Tay-Sachs, given a scenario or genetic problem.

35 **Dorothy and her husband Jay do not have cystic fibrosis. They took genetic tests to find out if they carry the allele for cystic fibrosis. Dorothy carries the allele for cystic fibrosis and Jay does not.**

What is the probability that their first child will have cystic fibrosis?

A 0%

B 25%

C 50%

D 75%

Performance Indicator: Analyze a dihybrid cross to determine the probability of a particular trait, given a completed Punnett square.

36 Gregor Mendel used pea plants to study how traits are inherited. He observed that the pea plants produced either round or wrinkled seeds, and had either purple or white flowers. The alleles for purple flowers (P) and round seeds (R) are dominant. The alleles for white flowers (p) and wrinkled seeds (r) are recessive.

A cross between two plants with purple flowers and round seeds is shown in the Punnett square below.

	PR	Pr	pR	pr
PR	PPRR	PPRr	PpRR	PpRr
Pr	PPRr	PPrr	PpRr	Pprr
PR	PPRR	PPRr	PpRR	PpRr
Pr	PPRr	PPrr	PpRr	Pprr

What fraction of offspring will have purple flowers and wrinkled seeds?

F $\dfrac{2}{16}$

G $\dfrac{4}{16}$

H $\dfrac{8}{16}$

J $\dfrac{12}{16}$

Reporting Category: 7. Biotechnology/DNA

Performance Indicator: Relate changes in the DNA instructions that cause mutations, given diagrams.

37   **Normal and mutated DNA base sequences are shown below.**

Normal DNA Base Sequence	GGC CTA ACC

Mutated DNA Base Sequence	GGC CA ACC

Which of these describes the <u>most likely</u> result of the mutation?

A   The DNA mutation will prevent DNA replication.

B   The mutated DNA sequence will cause other types of mutations to occur.

C   The mutated DNA sequence will code for different amino acids than the normal sequence.

D   The mutated DNA sequence will code for a lipid.

Performance Indicator: Relate changes in the DNA instructions that cause mutations, given diagrams.

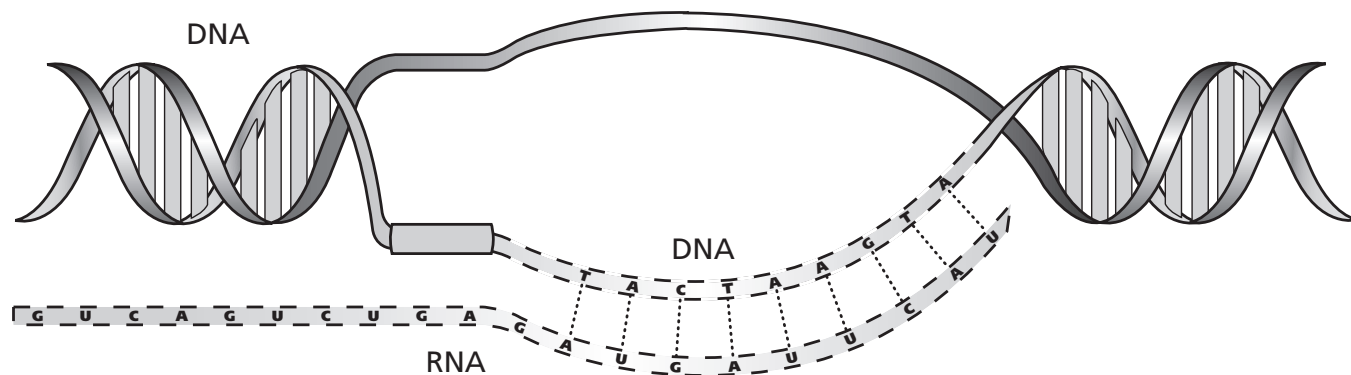**38** **The diagram below shows a change in a strand of DNA.**

BEFORE   **AFTER**
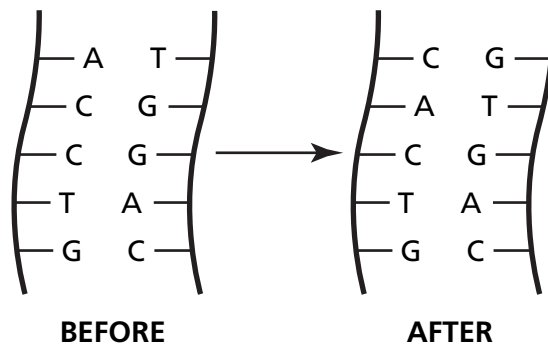
This change is an example of

F   replication

G   succession

H   translation

J   mutation

Performance Indicator: Recognize the major functions of DNA as replication or transcription, given diagrams and/or descriptions.

39 **The diagram below shows the production of an RNA strand in a plant cell.**

In which process will the RNA strand be used next?

A replication

B photosynthesis

C DNA synthesis

D protein synthesis

Performance Indicator: Analyze a series of DNA bases to determine the sequence which demonstrates a mutation.

40 **The diagram below shows some of the codons in a section of DNA.**

TGT – GGG – TAC – CAT – TTA

What type of mutation would cause TAC to be incorrectly copied as TAG?

F a deletion mutation

G a frameshift mutation

H an inversion mutation

J a substitution mutation

Performance Indicator: Analyze DNA fingerprinting using an illustration of DNA bands.

41 Scientists were studying turtles living on a group of small islands. They analyzed DNA from four populations of turtles. The resulting DNA bands are shown below.


Island 1   Island 2   Island 3   Island 4
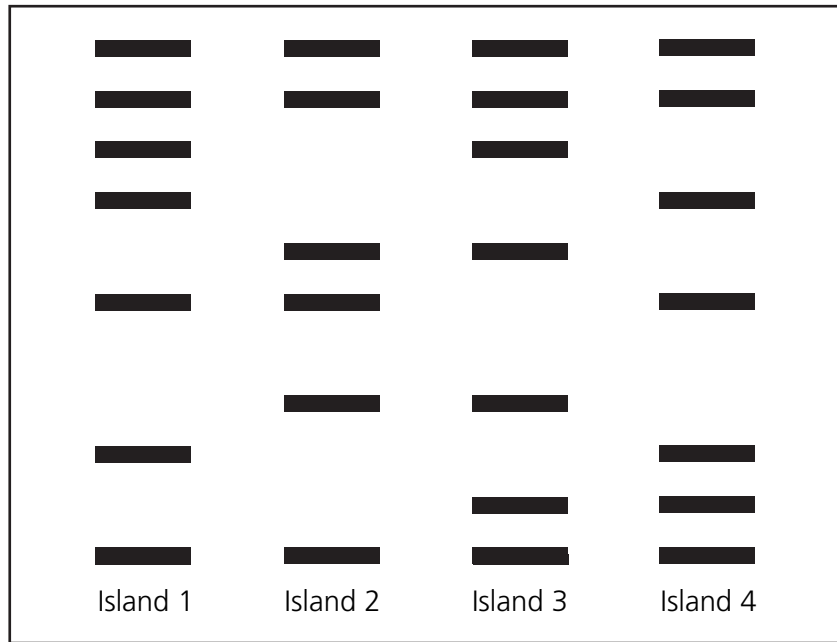
Which two islands have turtle populations that are <u>most</u> closely related?

A   Islands 1 and 2

B   Islands 1 and 4

C   Islands 2 and 3

D   Islands 3 and 4

Performance Indicator: Differentiate the processes of replication, transcription, and translation, given diagrams and/or descriptions.

42 The diagram below shows a molecular process taking place inside the nucleus of a cell.
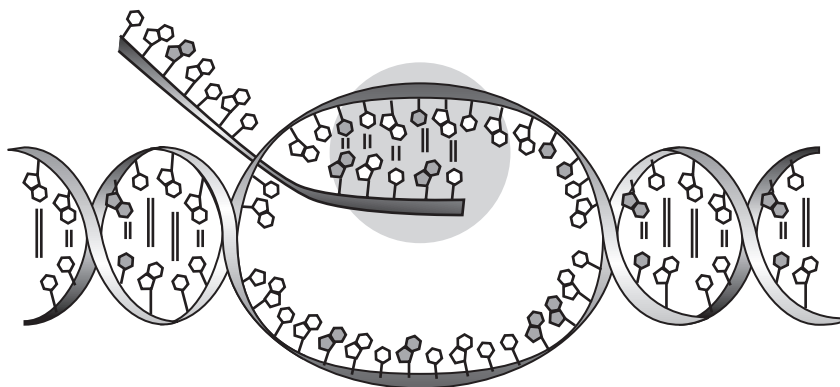
This process is called

F osmosis

G translation

H cytokinesis

J transcription

Performance Indicator: Recognize the relatedness of species using illustrations of anatomical structures, protein sequences, and/or DNA bands.

43 Researchers are studying strands of DNA from four different species of squirrels.

DNA FROM FOUR SPECIES OF SQUIRRELS

Species 1	ATG GGT CAC ATT CGC
Species 2	ATG GGT ACC TTT GGC
Species 3	ATG GGT CAC TTT CCG
Species 4	ATG GGA CAC ATT CGC

Based on the DNA strands above, which two species are most closely related?

A Species 1 and 3

B Species 1 and 4

C Species 2 and 3

D Species 3 and 4

Reporting Category: 8. Diversity: Biomes and Classification

Performance Indicator: Infer the relatedness of different organisms using the Linnean system of classification, given pictures and/or descriptions of a variety of different plants or animals and a classification key.

44   **The common and scientific names for three kangaroos are shown below.**

KANGAROO NAMES

Common Name	Tree Kangaroo	Red Kangaroo	Western Gray Kangaroo
Scientific Name	*Dendrolagus matschiei*	*Macropus rufus*	*Macropus fuliginosus*

Which of these statements about the classification of the three kangaroos is accurate?

F   The three kangaroos belong to three different families of marsupials.

G   The Tree Kangaroo and the Red Kangaroo belong to the same family and genus.

H   The Red Kangaroo and the Western Gray Kangaroo are classified as the same species but are not part of the same genus.

J   The Red Kangaroo and the Western Gray Kangaroo are classified in the same genus but are different species.

Performance Indicator: Infer the biome in which an animal or plant lives, given a description of the organism and pictures of various biomes.

45 A certain type of animal has short legs and a compact, chunky body. It has light-colored fur that is short in summer and grows long and shaggy in winter. This animal has powerful hind legs, and hooves with a hard outer rim and a rubbery inner surface.

Which of these biomes is <u>most likely</u> to be the habitat of this animal?
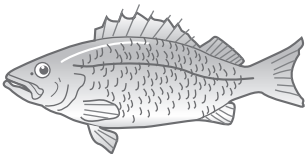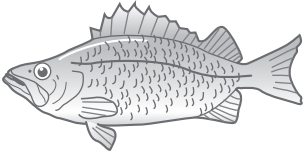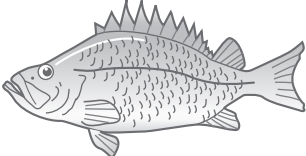

A

C

B

D

Performance Indicator: Infer the relatedness of different organisms using the Linnean system of classification, given a picture of a variety of different plants or animals and a key to classification of organisms.

46 The fish in the table below share the common name red snapper, but their scientific names are different.

Common Name	Red snapper	Red snapper	Red snapper
Scientific Name	*Sebastes goodei*	*Sebastes paucispinis*	*Sebastes levis*

Which of these statements about the classification of these fish is correct?

F They do not belong to the same genus or species.

G They belong to the same genus and species.

H They belong to the same species, but not the same genus.

J They belong to the same genus, but not the same species.

Performance Indicator: Determine the genus and species of an organism, given a dichotomous key containing descriptions of the characteristics at each classification level.

Use the picture and the classification key below to answer Number 47.
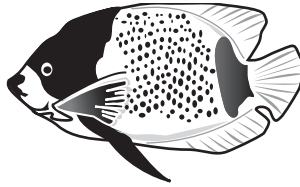
CLASSIFICATION KEY

1. a. Several stripes on body .... go to 2 (*Pomacanthus*)
   b. Several spots on body .... go to 3 (*Euxiphipops*)
2. *Pomacanthus*
   a. Several large vertical stripes across body ..... *Pomacanthus paru*
   b. One vertical stripe across eye and several
      horizontal stripes on body..................... *Pomacanthus imperator*
3. *Euxiphipops*
   a. Several spots on middle of body .... *Euxiphipops navarachus*
   b. Several spots on head .... *Euxiphipops xanthometapon*

47 **According to the classification key, this organism is a member of which genus and species?**

A   *Pomacanthus paru*

B   *Pomacanthus imperator*

C   *Euxiphipops navarachus*

D   *Euxiphipops xanthometapon*

Performance Indicator: Apply knowledge of divergent evolution, as in Darwin's finches, to determine why species with a common ancestor have adapted differently, given a diagram or description.

48 Charles Darwin found several species of finches on the Galapagos Islands. The different species were similar except in the shape and size of their beaks as shown in the diagram below. Darwin hypothesized that the finches on the islands had evolved from a common ancestor.


Which of these was a factor that allowed one species of finch to evolve into several different species?

F   Only one type of food was available.

G   Only one type of habitat was available.

H   All mutations in the population were beneficial.

J   Many different types of food were available.

Performance Indicator: Compare homologous structures in species to determine the relatedness of certain species, given diagrams or pictures.

49 Scientists often determine the relatedness of different species by comparing the structures of their bones. The skeletons of three mammals are shown below.
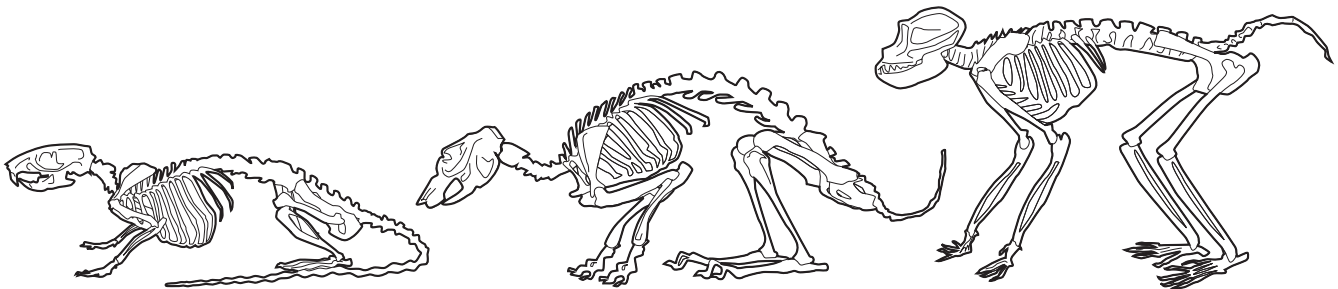
Which of these characteristics is <u>best</u> for determining which two are most closely related?

A   size of ribs

B   shape of skull

C   length of spine

D   presence of tail

Reporting Category: 9. Diversity: Body Systems and Life Cycles

Performance Indicator: Determine whether an insect undergoes complete or incomplete metamorphosis, given pictures, diagrams, or descriptions.

50 The diagram below shows the life cycle of a chinch bug.

CHINCH BUG LIFE CYCLE
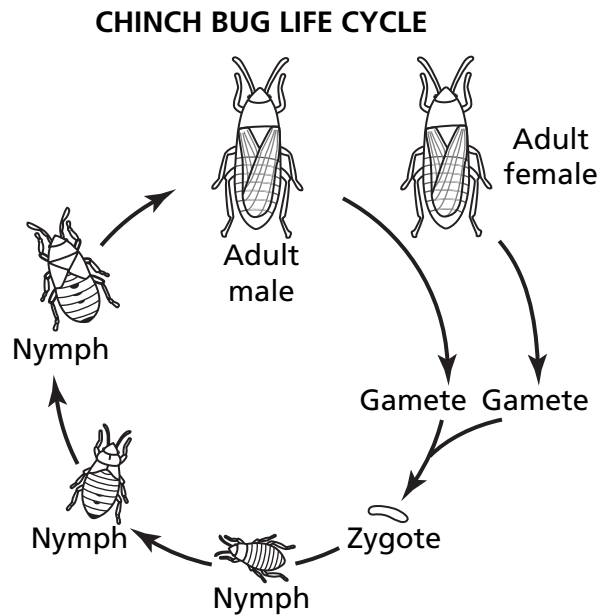
This life cycle shows an example of

F incomplete metamorphosis

G asexual reproduction

H complete metamorphosis

J selective breeding

Performance Indicator: Infer the body symmetry of an organism, given a diagram, picture and/or description.

51 **Study the sea anemone below.**
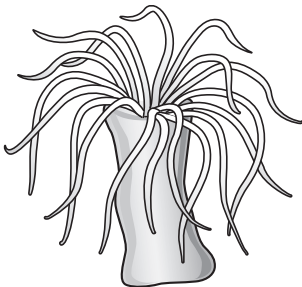
Which of these body forms does this sea anemone have?

A   asymmetrical

B   bilateral

C   colonial

D   radial

Performance Indicator: Predict the function of a system or organ, given structural descriptions, whether in the earthworm, crayfish, frog, or human.

52 **What system filters salts and metabolic wastes from the blood?**

   F   digestive

   G   excretory

   H   respiratory

   J   circulatory

Performance Indicator: Predict the function of an organ, given a description of its component tissues.

53 **In humans, a particular organ is long, muscular, and open at both ends. This organ has three major regions and its inner surface is extensively folded. Each fold contains many finger-like projections that are richly supplied with blood capillaries.**

The main function of this organ is to

   A   circulate blood

   B   control reflex actions

   C   digest and absorb materials

   D   absorb oxygen and give off carbon dioxide

Performance Indicator: Compare and contrast the life cycles of various organisms to include alternation of generations, given diagrams or pictures.

The diagrams below show the life cycle of a liverwort and the life cycle of a fruit fly. Use the diagrams and the key to answer Number 54.

LIVERWORT LIFE CYCLE

Spores (1n)

Sporophyte (2n)

Young gametophytes (1n) (1n)

Female gametophyte (1n)

Sperm (1n)

Male gametophyte (1n)

Zygote (2n)

FRUIT FLY LIFE CYCLE

Adult female (2n)

Adult male (2n)

Pupa (2n)

Gametes (1n)

Larva (2n)

Zygote (2n)
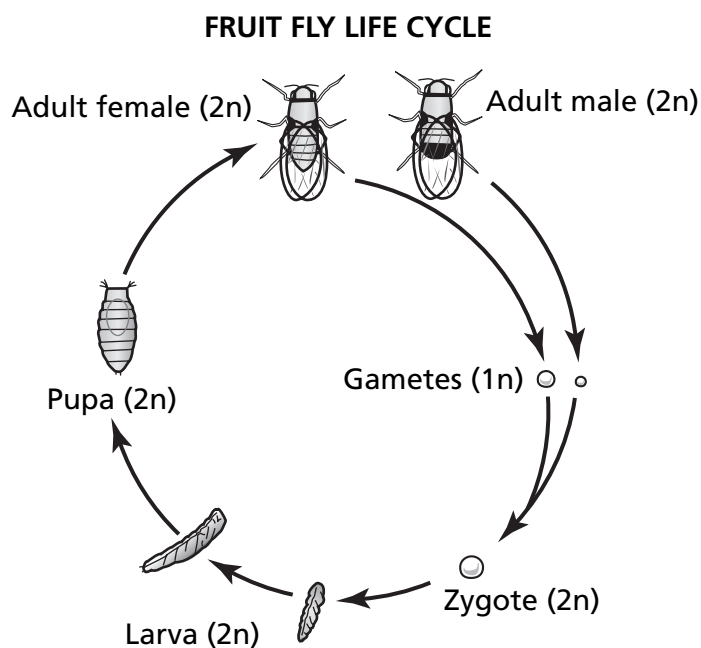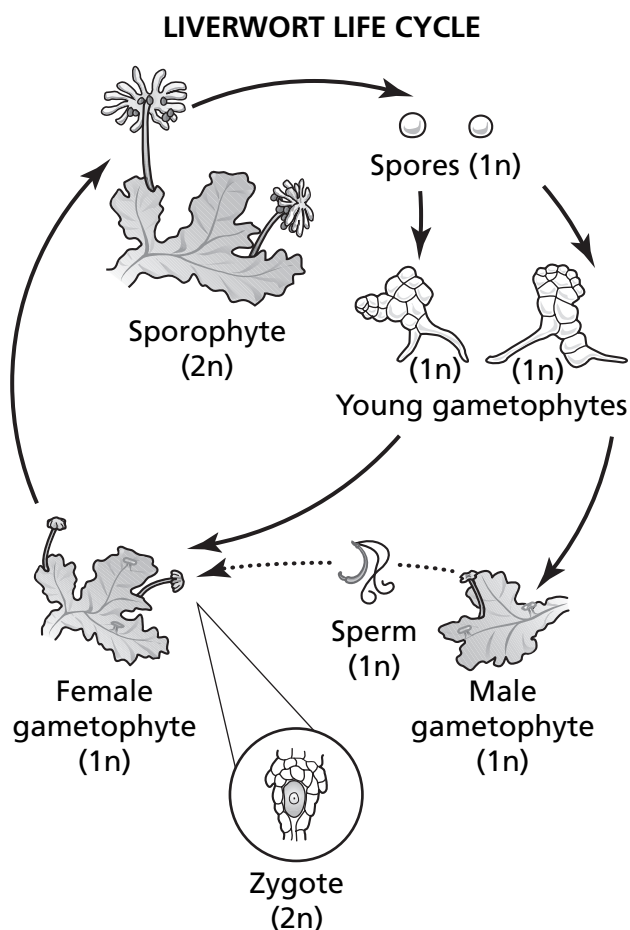
KEY
1n: Cells of organism have one copy of each chromosome.
2n: Cells of organism have two copies of each chromosome.

54 **Which of these statements is true about the life cycles above?**

F Alternation of generations is a characteristic of the fruit fly's life cycle.

G Incomplete metamorphosis is a characteristic of the liverwort's life cycle.

H Meiosis occurs during the life cycles of both the liverwort and the fruit fly.

J Asexual reproduction occurs during the life cycles of both the liverwort and the fruit fly.

Reporting Category 1:		Cell Organelles and Biomolecules
Item Number	**Correct Answer**	**Performance Indicator**
1	A	Identify major cell organelles and their functions, given a diagram, description, and/or scenario.
2	F	Distinguish between plant and animal cells given diagrams or scenarios.
3	C	Distinguish among proteins, carbohydrates, lipids, and nucleic acids, given structural formulas.
4	F	Identify a positive test for carbohydrates and lipids when given an experimental procedure, data, and results.
5	D	Identify the biomolecules responsible for communication, response, regulation, or reproduction in the cell.

Reporting Category 2:		Cell Processes
Item Number	**Correct Answer**	**Performance Indicator**
6	J	Predict the movement of water molecules across a semi-permeable membrane, given a diagram showing solutions of different concentrations.
7	C	Sequence a series of diagrams depicting the movement of chromosomes during the cell cycle.
8	F	Compare and contrast the cell cycle in plant and animal cells, given a diagram or description.
9	A	Distinguish between active and passive transport, given examples.
10	G	Evaluate the role of meiosis in maintaining genetic variability and continuity, given a scenario.
11	C	Determine the number of chromosomes following mitosis or meiosis, given the number of chromosomes in the original cell.
12	J	Recognize the importance and mechanisms of homeostasis to the viability of organisms, given a scenario.

Reporting Category 3: Interactions: Between Organisms and Behavior

Item Number	Correct Answer	Performance Indicator
13	A	Identify commensalism, parasitism, and mutualism, given a scenario with examples.
14	F	Classify an organism as a producer, consumer, or decomposer, given its behavior.
15	A	Identify abiotic and biotic factors, given a description or an illustration of an ecosystem.
16	J	Distinguish between a learned or an innate behavior, given a description of that behavior.
17	A	Differentiate between the relative age of fossils in sedimentary rock, given a diagram, scenario, or description of rock strata.

Reporting Category 4: Interactions: Population Dynamics and Energy Flow

Item Number	Correct Answer	Performance Indicator
18	G	Make inferences about how environmental factors would affect population growth, given a scenario.
19	B	Examine the energy flow through the trophic levels of an ecosystem, given a diagram and/or scenario.
20	H	Determine the effects of human activities on ecosystems, given a scenario.
21	A	Analyze and interpret population growth curves, given graphs.
22	H	Predict how environmental changes affect the formation of a new species or extinction of an existing species, given a scenario.
23	C	Differentiate between natural selection and selective breeding, given a scenario.

Reporting Category 5: Photosynthesis and Respiration

Item Number	Correct Answer	Performance Indicator
24	H	Identify the reactants and products of photosynthesis and respiration, given the equations.
25	D	Identify the cell organelle in which photosynthesis and/or respiration occurs, given a diagram.
26	J	Interpret a diagram of the carbon-oxygen cycle.
27	A	Distinguish between aerobic and anaerobic respiration in terms of the presence or absence of oxygen and ATP produced.
28	G	Investigate the interdependence of photosynthesis and respiration in living organisms, given a diagram or scenario.
29	C	Relate how energy is transferred from cellular energy to cellular work.

Reporting Category 6: Genetics

Item Number	Correct Answer	Performance Indicator
30	J	Distinguish between asexual and sexual methods of reproduction, using a scenario.
31	D	Identify dominant and recessive traits, given the results of a monohybrid cross in a scenario.
32	J	Determine the genotype and phenotype of a monohybrid cross, given a Punnett square.
33	C	Identify the sex chromosomes in humans and recognize inheritance patterns that are sex-linked (x-linked), using a pedigree or scenario.
34	H	Analyze modes of inheritance including codominance, incomplete dominance, and multiple alleles using genetic problems or Punnett squares.
35	A	Determine the probability of having a child with an autosomal disorder, such as cystic fibrosis or Tay-Sachs, given a scenario or genetic problem.
36	G	Analyze a dihybrid cross to determine the probability of a particular trait, given a completed Punnett square.

Reporting Category 7:   Biotechnology/DNA

Item Number	Correct Answer	Performance Indicator
37	C	Relate changes in the DNA instructions that cause mutations, given diagrams.
38	J	Relate changes in the DNA instructions that cause mutations, given diagrams.
39	D	Recognize the major functions of DNA as replication or transcription, given diagrams and/or descriptions.
40	J	Analyze a series of DNA bases to determine the sequence which demonstrates a mutation.
41	B	Analyze DNA fingerprinting using an illustration of DNA bands.
42	J	Differentiate the processes of replication, transcription, and translation, given diagrams and/or descriptions.
43	B	Recognize the relatedness of species using illustrations of anatomical structures, protein sequences, and/or DNA bands.

Reporting Category 8:   Diversity: Biomes and Classification

Item Number	Correct Answer	Performance Indicator
44	J	Infer the relatedness of different organisms using the Linnean system of classification, given pictures and/or descriptions of a variety of different plants or animals and a classification key.
45	C	Infer the biome in which an animal or plant lives, given a description of the organism and pictures of various biomes.
46	J	Infer the relatedness of different organisms using the Linnean system of classification, given a picture of a variety of different plants or animals and a key to classification of organisms.
47	C	Determine the genus and species of an organism, given a dichotomous key containing descriptions of the characteristics at each classification level.
48	J	Apply knowledge of divergent evolution, as in Darwin's finches, to determine why species with a common ancestor have adapted differently, given a diagram or description.
49	B	Compare homologous structures in species to determine the relatedness of certain species, given diagrams or pictures.

Reporting Category 9:		Diversity: Body Systems and Life Cycles
Item Number	**Correct Answer**	**Performance Indicator**
50	F	Determine whether an insect undergoes complete or incomplete metamorphosis, given pictures, diagrams, or descriptions.
51	D	Infer the body symmetry of an organism, given a diagram, picture and/or description.
52	G	Predict the function of a system or organ, given structural descriptions, whether in the earthworm, crayfish, frog, or human.
53	C	Predict the function of an organ, given a description of its component tissues.
54	H	Compare and contrast the life cycles of various organisms to include alternation of generations, given diagrams or pictures.